# AMS Handbook

# Exterior Condition of Filled Food Containers



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U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

INSPECTION PROCEDURES FOR

EXTERIOR CONDITION OF FILLED FOOD CONTAINERS

## --PURPOSE AND SCOPE--

This handbook provides uniform procedures, guidelines and aids to assist AMS food commodity graders and inspectors in applying acceptance procedures in accordance with the U. S. Standards for Condition of Food Containers.

This handbook and the U. S. Standards for Condition of Food Containers will be used when a Government agency or private user of the service specifically requests that the exterior of filled food containers or shipping cases be examined for condition. This request may be in the form of a specific reference to the U. S. Standards in the purchase document or a request for USDA certification that the food product was packaged in accordance with such general terminology as "good commercial practices." However, when these U. S. Standards are not referenced, the inspection or grading service may establish and adopt different procedures if it concludes that such action would be desirable. In the absence of a request for examination of condition of containers, inspection personnel should not overlook conditions that are obviously a departure from good commercial practice. Therefore, if containers are not examined according to these standards or other established procedures, the applicant should be forewarned that a formal condition inspection will be made if the lot is subsequently offered for delivery to a government agency.

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# INSPECTION PROCEDURES FOR EXTERIOR CONDITION OF FILLED FOOD CONTAINERS

## I GENERAL

This handbook is designed to assist personnel of the various food commodity inspection Divisions in applying condition of container inspection procedures in accordance with the U. S. Standards for Condition of Food Containers. The standards cover any type of filled food container which may require container examination of the exterior for visual defects. The standard may be applied to shipping cases or secondary containers as well as primary containers.

The U. S. Standard for Condition of Food Containers includes definition of terms, sampling plans, defect classifications, acceptance criteria and operating characteristic curves, together with considerable explanation as to their application. There are, however, administrative details of application, as well as guidelines for inspection that are not fully covered by the standard. This handbook provides these additional instructions and guidelines to assure more uniform application of the standards. The respective food commodity Divisions may find it appropriate to issue further supplemental instructions regarding policy decisions that may be peculiar to that division's program and that may not be fully covered either by the standard or this handbook.

"Inspection" and "Grading" as used in this handbook mean the same. In order to avoid excessive wordage, inspection or inspector is generally used in the remaining portions of this handbook.

This handbook is prepared in a manner to lend maximum assistance to AMS inspectors. In accomplishing this objective the procedures follow a sequence that would fit most situations -- starting with the inspection request and continuing through to a decision as to whether the lot meets or fails to meet the requirements of the standards. Appended to this handbook are separate, but related, aids that lend further versatility to the standards and inspection procedures.

## II INSPECTION PROCEDURE

### A Application for Inspection Service

Requests for inspection are generally directed to the appropriate inspection office by letter, wire or telephone. In some instances the inspector may be at the plant or warehouse on a sampling job and he is asked to check additional lots; or the inspection office may receive a copy of the contract from a food procuring agency and contact the vendor and arrange for inspection.

Whenever possible the details regarding inspection should be recorded on the AMS worksheet (Form AMS-310) or a suitable application form. This information then becomes a part of the inspection records.

Information generally requested and recorded is:

1 Date and hour of application.

2 Name and address of the applicant and the receiver.

3 Name of person requesting the inspection.

4 Name of the person to be informed of the results.

5 Name of the packer.

6 Name and address of the warehouse.

7 Location of the lot(s), (i. e. aisle, bay etc.)

8 Pertinent information concerning the lot(s) such as lot numbers, railroad car numbers, contract or purchase order numbers, length of storage, shipping deadlines, etc.

9 The number, type and size of containers, and label (if labeled).

10 Codes and the approximate number of cases of each.

11 Inspection status: i.e., initial; or if reoffered has the lot been previously inspected and if so by whom, what were the results, and has lot been reconditioned.

12 The basis of the inspection; i.e., federal specification, purchase contract, container inspection required, etc.

13 Deviations from the standard, such as AQL's other than 0.15, 1.0 and 6.5; special defects not covered by the standard.

14 Mutually agreed upon time to perform the inspection.

B Sampling

1 Preparation

A few minutes spent in studying the inspection request, the contract and other pertinent documents as well as assembling working tools will prevent delays and errors in handling the assignment. Many food packers work on close delivery schedules and timing can be an important consideration. Therefore, it is necessary that the USDA inspector arrive on time, and if a delay in arrival is anticipated, the applicant or warehouseman should be notified.

The inspector should be briefed by his supervisor on any abnormal conditions likely to be encountered and any unusual precautions that should be taken in handling the assignment.

2 Materials and Equipment

Prior to performing the condition inspection, the inspector must determine that the following equipment (as applicable) is in his possession and is in good working condition.

a U. S. Standards for Condition of Food Containers.

b A copy of this AMS Handbook.

c AMS visual inspection aids.

d Worksheets for recording defects.

e Flashlight.

f Tools for opening shipping containers (knife, wire cutters, etc.).

g Clean hand towels, or other similar material.

h Acceptance or certification stamps (when required).

i Marking pen or pencil.

j Cold weather gear (for freezer work).

3 Initial Contact

Upon arrival at the warehouse, the inspector should identify himself and review the purpose of his visit with the appropriate individual, generally the warehouse foreman.

Unless previous arrangements have been made, the inspector should ask for any necessary assistance from plant or warehouse personnel. In many cases, a lift-truck with driver is required to break down the stacks. If a large number of lots are to be sampled, the inspector should seek assistance from the applicant or warehouseman to help case and transport samples to the inspection area. Usually the applicant or warehouseman is anxious to expedite the sampling and willingly cooperates. Undue delays in sampling should be reported to the inspector's supervisor.

Inspectors and samplers visiting the same warehouse on a frequent basis will soon have a pattern of operation established and the assignment can be accomplished expeditiously with a minimum of preparatory arrangements and discussions.

4 Lot Identity

Inspection lots must be properly identified in order that --

a Product sampled and examined can be verified as the same as reported by the applicant;

b Lots inspected can be associated with related reports and certificates;

c Errors in shipping out the wrong lots are precluded;

d Subsequent inspections (if requested) can be related to previous inspections;

e Reconditioned or re-worked lots can be differentiated from originally inspected lots.

f Checkloading, if required, can be properly carried out by another inspector.

g Receivers can identify acceptable lots.

Inspection lots may be identified in the following ways:

a Commodity, type and style

b Number, size and type of container

c Code or other identification marks

d Label and case marks

e Warehouse receipt or lot number

f Warehouse location, including room, stack or row, aisle number or letter and proximity to a permanent object such as door, wall, window, office.

5 Preliminary Inspection (Scanning)

After the lot has been properly identified the inspector should approximate the count in each lot to verify the warehouse count. While scanning the lot, determine if any segments or portions appear abnormal with respect to wet cases, blown cans, top layer rust, leakers, etc. If any such segments or portions are noted and are of any consequence, the lot will be rejected for condition of container without further sampling.

If the lot is rejected prior to sampling it cannot be subsequently inspected until the lot has been reconditioned. If no abnormal portions are observed, samples may be drawn to determine condition.

6 Sampling Procedure

a Sample Size

Calculate the number of primary containers in the lot. Locate the appropriate lot size in Table I -- Sampling Plan. Select the proper sample size corresponding to the appropriate lot size. This is the minimum sample size for normal inspection. The inspector may always select a higher plan at his discretion. For example, if numerous codes are present a higher plan may be advisable. However, if the inspection is an appeal or re-inspection of a previously rejected lot that has been segregated, the sampling plan selected must be at least two plans higher than the minimum indicated for normal inspection.

b Drawing Sample

As indicated in the standard, containers may be drawn either according to proportional random sampling or according to simple random sampling. If the number of cases per code mark are known proportional sampling is preferred. Regardless of the procedure followed samples must be representative of all portions of the lot. This will generally require a complete breakdown of the lot in order that all portions are accessible for sampling. From a practical standpoint, if the inspector can sample each pallet the lot is generally considered accessible for sampling. On the other hand if only the top of the stacks are available such lot is not accessible for representative sampling and the inspection certificate must be restricted to only those portions that are available.

**Predetermine the containers or cases from which containers will be drawn and mark them or point them out to the warehouseman. The predetermined plan for selecting samples will be such that all horizontal and vertical layers in a stack will have an equal chance of being represented. If the containers are cased, predetermine how many to draw from each case selected and which containers to select. Examine no more than 6 containers from cases packed 12 or less per case, and no more than 12 from cases packed more than 12 per case. The predetermined plan for selecting containers from a case will be such that all vertical and horizontal layers will have an equal chance of being represented. These predetermined plans for selecting cases and containers will eliminate bias due to accessibility of containers and readily visible defects.**

There may be instances in which a defective container will be noted that falls outside the predetermined sampling patterm. This container, must not be purposely selected just because it is defective. It should be drawn only if it falls in the predetermined pattern; nevertheless, whenever practical any seriously defective container should be removed from the lot and replaced. There will also be instances in which it will be

obvious that defective containers will be localized. For example the entire top layer of a stack may contain rusted cans; or the front of a stack may show extensive damage due to fork lift equipment; or the bottom layer may have been standing in water. In these instances identify the sample units with the respective portions of the lot in order that the applicant may be properly informed of the condition in the event reconditioning is in order.

Most of the sampling plans in Table I are double plans -- i.e. they consist of a 1st sample and a 2nd sample. In the case of the double plans the 1st sample must be examined first and a decision made to accept, reject, or continue with the sampling. Ordinarily the 2nd sample would not be drawn unless it were later determined to be required to make a decision on the lot. There may be circumstances in which it would be desirable to draw both the 1st and 2nd samples on the initial sampling of the lot. However, in such instances, examination of the 2nd sample should be held in abeyance pending the outcome of the 1st sample.

7 Classifying and Recording Defects

The containers must be examined under proper illumination in order that visual defects can be easily detected. Examine each container carefully. Refer to Table II --"Defects of Containers"and Inspection Aids, as may be applicable, to properly classify each type of defect.

The standard is based on "the number of defects per 100 containers" rather than "percent defective containers." It is necessary to determine if the defects on any one container are "related" defects or "unrelated" defects. A container having more than one class of unrelated defects is scored for each such type of defect. A container with related defects is scored only once, and for the most serious of the defects; a container with unrelated defects is scored for each defect.

In the event there is doubt as to whether defects are related or unrelated, score the container as related using the most serious category of defects.

Record the number and type of defects on the worksheet using the appropriate columns to identify each category of defect - namely critical, major or minor. If a 2nd sample is required to classify the lot, record each set of samples so they can be separately identified on the work sheet. Total the number of defects in each of the above categories.

8 Lot Acceptance Criteria

The acceptability of the lot is determined by referring to Table I. For a given sample size acceptance and rejection numbers are provided for critical, major and total defects. Total defects include not only critical and major defects but also minor defects.

Unless otherwise specified, use the criteria for AQL's 0.15, 1.0 and 6.5 for critical, major and total respectively.

Refer to the appropriate acceptance (Ac) and rejection (Re) numbers for the first sample:

a If none of the respective defects exceed "Ac", the lot is considered acceptable.

b If any one of the respective defects equal or exceed "Re", the lot fails.

c If any one or all of the defects exceed "Ac" but are less than "Re", the second sample is evaluated; all the defects in the combined sample are compared with the acceptance and rejection numbers in the table for each AQL and a positive decision made to either accept or fail the lot.

For example -- A lot contains 2000 cases, 24 No. 2-1/2 cans each, or 48,000 containers. Sampling plan code CG in Table I-A is applicable for lots ranging from 36,001 to 72,000 containers. A sample of 252 containers is examined as is indicated under "Sample Size" opposite code CG for the first sample size. This sample contained 20 minor, 5 major and no critical defects for a total of 25 defects. The lot can neither be accepted nor rejected on this sample for major or total defects because the 5 major defects are between the Ac = 2 and Re = 7 for AQL = 1.0, and 25 total defects are between Ac = 17 and Re = 26 for AQL = 6.5. Therefore a second sample of 288 containers is examined and the additional critical, major and minor defects found are added to those defects found in the first sample. Suppose the total defects found in the 540 sample units equal 33 minor, 9 major, and 1 critical for a total of 43 defects. The one critical, 9 major and 43 total defects are all less than the acceptance (Ac) numbers of 2, 10, and 45, therefore the lot is accepted. However, had the number of defects for any of the classes exceeded the applicable acceptance number the lot would fail the condition of container requirements.

## III INTERNAL DEFECTS

The AMS standard is not designed to cover internal defects in food containers. This is due largely to the economic limitations of opening a sufficient number of containers to satisfy the minimum inspection level of the sampling plans. Normally only a relatively few containers from each lot are opened for grade determination or otherwise subjected to testing that results in destructive sampling.

Despite the fact that internal container condition is excluded from the standard, inspectors should not overlook internal defects that are of sufficient consequence to affect the merchantability or keeping quality of the lot. As a general rule internal defects occur infrequently. The container is fabricated from such materials and in such a manner as to withstand deterioration when used on the proper commodity and processed according to acceptable commercial practices. There are, however, instances in which the condition of a lot is adversely affected by internal container defects. An example is canned corn in which the enamel lining of the container is severely fractured causing "flaking off" together with product discoloration.

This handbook cannot offer definitive guidelines for internal container inspection other than to recommend that each container opened for product examination should be checked for visual internal defects. Based on the normal small sample examination the occurrence of one or more defects that are of consequence is sufficient evidence for rejection. If the applicant desires a more reliable estimate of internal defects, a large sample must be drawn from the lot, the containers opened, defects classified according to judgment and experience and a report made according to these findings. The applicant must be fully advised that such an inspection will necessarily result in destruction of a large number of containers. If the sample size is large enough to meet the minimum of the sampling plan for the corresponding lot size the acceptance criteria of the standard may be applied, provided that container acceptance does not preclude rejection of the lot because of damage to the product itself.

Food commodity Divisions may supplement this handbook with instructions and guidelines for handling internal container defects for those products under their specialization.

## IV SHIPPING CASES

Although the standard is directed essentially toward the inspection of primary containers it may also be applied to shipping cases or secondary containers. Section 42.103 of the standard provides for this coverage. In checking shipping cases the lot size would be the number of cases in the lot rather than the number of primary containers in the lot. Defects would be classified in accordance with Table II - Defect series 100, 200, 600 and 700. It is possible that defects, other than those listed in Table II of the standards, will be encountered and which may be more pertinent to shipping cases. In such instances they will be classified according to their severity. It is also possible that certain types of defects would be cited in the contract or purchase specification. In such instances these defects must also be considered in making the condition inspection. For example the purchase specification may reference the USDA standard for condition inspection of fiber shipping cases. In addition it may specify that -

(1) a flap with no glue is a major defect and

(2) a flap that separates upon lifting the filled case is a minor defect.

In this example the cases drawn for visual examination would also be tested for adequacy of gluing based on the above defect classification.

## V INSPECTION REPORTS

The guidelines and reporting procedures outlined in this section are applicable to food commodity Divisions and reflect the overall policy of AMS with respect to application of the condition of food container standards. Nevertheless, circumstances may necessitate a departure from these guidelines and procedures in order to cope with a particular situation. While it is recommended that the inspection services adhere closely to the reporting procedures contained herein, it is also recognized that a certain amount of flexibility must be retained by the respective branches and divisions in order to carry out their functions.

### A Certification

The type of report or certification with respect to condition of container will depend to a great extent upon the requirements of the purchase specification and the wishes of the applicant. However, there are certain guidelines or principles that can be followed under the various circumstances. These principles are as follows:

GOVERNMENT AGENCIES

1 If condition of container inspection is specifically cited to be in accordance with the U. S. Standard or if the agency requests a USDA certification that the container was packaged under "good commercial practices:"

Example 1 (Lot Meets)

Condition of containers - Meets applicable USDA Standards for Condition of Food Containers.

Example 2 (Lot Fails)

Condition of containers - Fails applicable USDA Standards for Condition of Food Containers because (insert reason for failure).

2 If the agency requests a detailed breakdown of defects on failed lots, insert a heading for condition of container in the Body of the certificate and enumerate defects as follows:

Example 3 (Lot Condition of Container Fails)

In the Body:

"Condition of Container - Defects noted in a sample of 126 cans include 18 major rust, 3 buckled, 9 major dents."

NOTE: Ordinarily the purchasing agency would not request this detail at time of origin inspection as the supplier would be obligated to replace failed lots with acceptable deliveries.

COMMERCIAL INSPECTIONS

1 Condition of Container specifically requested by applicant: In this instance include a heading in Body of the certificate for condition of container as well as a notation under Grade, as per following examples:

Example 4 (Lot Meets)

In the Body:

"Condition of Container - meets applicable USDA Standards for condition of food containers."

Example 5 (Lot Fails)

In the Body:

"Condition of Container - Fails USDA Standards for condition of food container, (insert reason for failure). If the applicant desires a detailed breakdown of defects, report as in Example 3.

2 Condition of Container examination not requested by applicant: In this instance do not check lot according to the formal plan but at the same time do not overlook a bad condition. In the case of obviously good lots do not mention container condition. In the case of obviously bad lots contact applicant and explain that the certificate will be "flagged" because of the bad condition. If he wishes to continue with the inspection for grade, regardless of condition, perform the inspection and flag the certificate according to the nature of the deviation.

Example 6 (Lot apparently satisfactory)

Do not refer to condition of container either in the Body, the Grade statement, or under Remarks.

Example 7 (Lot obviously defective)

In the Grade statement:

See Remarks for condition of lot.

Under Remarks state as follows:

"This certificate covers 2,000 cases 24 No. 303 cans (4,000 dozen) packed in unsealed corrugated fiber cases. Visual observation of lot indicates top layer of stack contains large number of seriously rusted containers."

SPECIAL CIRCUMSTANCES

There will be instances in which the applicant may request condition of container inspection only. Product quality is of no concern. If it is apparent that the lot

is damaged the inspector should increase the sample size to at least two plans higher than that indicated for the respective lot size. The inspection report will be restricted to Condition of Container examination only, as per the following examples:

Example 8 (Lot Meets)

In the Body:

"Condition of Container - Meets applicable USDA Standards for conditions of food containers." In addition a breakdown of defects may be given, as - 540 containers examined with a total of 9 defects of which 6 were torn cartons and 3 illegible markings."

Example 9 (Lot Fails)

Follow the same format as indicated for Example 8 but show a detailed breakdown with respect to defective containers. There will be instances in which the applicant will want to know the amount of damage within rather precise limits. In such instances the inspector must explain that the exact percent defective in the lot can only be determined through 100 percent inspection; however, a reasonable estimate can be made on the basis of a large representative sample. Assuming 100 percent inspection is impractical the applicant may wish an estimate of lot percent defective. In this instance follow the procedure as outlined in Appendix A attached to this instruction. Initially draw a rather large sample (for example 5 percent of lot), classify and enumerate defective containers. Then refer to Table III - Estimate of Percent Defective and determine the possible range of defects in the lot based on the initial samples. If the range is narrow (for example 1 or 2 percent) no further testing would be necessary. On the other hand if the range is large an additional sample should be taken and again evaluated. Combine the total sample for reporting purposes. Restrict the Certificate to condition of container examination and report as follows:

Example 10 (Lot Estimate)

"Condition of Container - 1250 containers examined and defects total 109 of which 65 are major dents, 23 serious rust, 11 torn labels and 10 stained with residual material.

APPENDIX A

# LOT ESTIMATE PERCENT DEFECTIVE

## I GENERAL

This section is not used to determine if a lot is accepted or rejected; rather it is a tool to estimate the extent of defective containers in the lot and determine reliability of a specific sample in estimating the number of defective containers in the lot.

If every container in the lot were inspected, the percentage of units found defective would be the actual or true percentage defective for the lot. Since all the units in a lot are not normally examined, the actual percentage defective in the lot is not known and must be estimated by use of sample results.

The percent defective in a sample may be used as an estimate of the percent defective in the lot. Table III shows the reliability of this estimate by indicating the range within the true percent defective in the lot may be expected to fall, based on the sample size and sample percent defective.

Table III also gives the sample size necessary to attain a desired reliability in estimating the extent of damage (or percent defective) in the lot.

## II USE OF TABLE III

As previously mentioned Table III may be used to —

(1) Estimate the percent defective in a lot based on sample data; and,

(2) Establish a sample of sufficient size to estimate the percent defective within prescribed limits.

In accomplishing these purposes the following procedures are applicable - Subpart A deals with lot estimate and Subpart B with sample size for estimate within prescribed limits.

### A Lot Estimate Percent Defective

1 Select a sample of such size as can be conveniently drawn and evaluated. Classify and enumerate defective containers according to the nature of the defect.

2 Calculate the percent defective (100p) for the applicable type and class of defect according to the following formula: $100p = \frac{100c}{n}$

100p = percent defective containers

c = number of defects of the applicable type and class found in the sample.

n = sample size

3 Refer to Table III and locate the value calculated for 100 p (as found in step 2) in the left hand column. If the table doesn't have the exact value, use the closest value listed.

4 In the horizontal column opposite the heading 100p, locate the sample size used in step 1 above. Here again if the exact value of n is not listed use the closest value for n.

5 Locate the point at which the 100p value and n value intersect. There are two values at this point - one opposite the letter L and one opposite the letter U. These represent the lower and upper limits of what to expect in the lot.

Example

An initial sample of 132 cans has 8 total defects of which 5 are serious rust and 3 dented.

(1) Total defective = $\frac{8}{132}$ or 6.06%

Rusted = $\frac{5}{132}$ or 3.79%

Dented = $\frac{3}{132}$ or 2.27%

(2) To estimate the total defectives in the lot, note that the value in the column 100p which is closest to 6.06 is 6.0; also, the sample size closest to 132 is 125.

(3) The two columns (identified in step 2 above) intersect at a value of L = 1.7 and U = 10.3.

This means that the total defective in the lot is expected to be somewhere between 1.7% and 10.3%.

(4) The values for serious rust and dented cans can similarly be determined by going through the same procedure as illustrated for total defective.

B Sample Size Required for Specified Accuracy

1 In the column headed by 100p locate the value found by examination of the first sample.

2 Move across the row horizontally and locate the values (L and U) that bracket the accuracy desired. This accuracy may also be a part of a specification requirement.

3 Move up this column (located in step 2 above) to the corresponding sample size at the top of the column.

4 The sample size located in step 3 is the sample size necessary to estimate the lot percent defective to the desired degree of accuracy.

Example

Using the data developed in Part A assume it is desired to estimate the percent rusted within 1 percent accuracy. Observe the following steps:

(1) In the column 100p the closest value to 3.79 is 4.0.

(2) Follow this column across the table until a set of values is obtained in which the difference between L and U is only 1.0 percent. This is represented by an L value of 3.5 and a U value of 4.5.

(3) Follow this range column upward to a sample size (n) of 6,000. This means that a total of 6,000 cans must be examined to assure that the percent defective found in this sample will be within 1 percent of the true lot percent defective.

(4) Possibly the time and expense required to get this degree of accuracy is unwarranted. If the applicant is willing to settle for an accuracy of 2.5 percent it would require examination of only 1000 cans. All these factors have a bearing on the extent of work performed in attaining accuracy.

(5) Another approach to the problem would be to take a second sample (for example 368 cans) for a total of 500 ($n_1 + n_2$). Then evaluate the sample results after classifying the 500 can sample. The percent defective in the total sample of 500 would be more accurate than the value obtained from the first sample of only 132.

TABLE III
ESTIMATE OF PERCENT DEFECTIVE CONTAINERS
CONDITION OF CONTAINER INSPECTION

| 100p | 1/ | SAMPLE SIZE (n) 18 | 36 | 50 | 75 | 100 | 125 | 150 | 200 | 250 | 300 | 375 | 450 | 500 | 600 | 800 | 1000 | 1250 | 3000 | 6000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.065 | L2/ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | U3/ | 1.3 | 0.9 | 0.8 | 0.7 | .6 | .5 | .5 | .4 | .4 | .4 | .3 | .3 | .3 | .3 | .2 | .2 | .2 | .2 | .1 |
| 0.10 | L | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | U | 1.6 | 1.2 | 1.0 | 0.8 | .7 | .7 | .6 | .6 | .5 | .5 | .4 | .4 | .4 | .4 | .3 | .3 | .3 | .2 | .2 |
| 0.15 | L | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | .1 |
| | U | 2.0 | 1.4 | 1.2 | 1.0 | .9 | .8 | .8 | .7 | .6 | .6 | .6 | .5 | .5 | .5 | .4 | .4 | .4 | .3 | .2 |
| 0.20 | L | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | .1 |
| | U | 2.3 | 1.7 | 1.5 | 1.2 | 1.1 | 1.0 | .9 | .8 | .8 | .7 | .7 | .6 | .6 | .6 | .5 | .5 | .5 | .4 | .3 |
| 0.25 | L | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1. | 1. |
| | U | 2.6 | 1.9 | 1.7 | 1.4 | 1.2 | 1.1 | 1.1 | 1.0 | .9 | .8 | .8 | .7 | .7 | .7 | .6 | .6 | .5 | .4 | .4 |
| 0.40 | L | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | .2 | .2 |
| | U | 3.4 | 2.5 | 2.2 | 1.9 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.1 | 1.0 | 1.0 | .9 | .8 | .8 | .8 | .6 | .6 |
| 0.60 | L | - | - | - | - | - | - | - | - | - | - | - | - | - | - | .1 | .1 | .2 | .3 | .4 |
| | U | 4.2 | 3.2 | 2.8 | 2.4 | 2.1 | 2.0 | 1.9 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 | 1.2 | 1.1 | 1.0 | .9 | .8 |
| 0.65 | L | - | - | - | - | - | - | - | - | - | - | - | - | - | - | .1 | .1 | .2 | .4 | .4 |
| | U | 4.4 | 3.3 | 2.9 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.4 | 1.3 | 1.2 | 1.2 | 1.1 | .9 | .9 |
| 0.80 | L | - | - | - | - | - | - | - | - | - | - | - | - | - | .1 | .1 | .2 | .3 | .5 | .6 |
| | U | 5.0 | 3.8 | 3.3 | 2.9 | 2.6 | 2.4 | 2.3 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.6 | 1.5 | 1.5 | 1.4 | 1.3 | 1.1 | 1.0 |

1/ Estimate of Lot Percent Defective From Sample.

2/ L = Lower Limit

3/ U = Upper Limit

TABLE III (Cont.)
ESTIMATE OF PERCENT DEFECTIVE CONTAINERS
CONDITION OF CONTAINER INSPECTION

| 100p [1] | SAMPLE SIZE (n) 18 | 36 | 50 | 75 | 100 | 125 | 150 | 200 | 250 | 300 | 375 | 450 | 500 | 600 | 800 | 1000 | 1250 | 3000 | 6000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 L[2] | - | - | - | - | - | - | - | - | - | - | - | .1 | .1 | .2 | .3 | .4 | .4 | .6 | .7 |
| 1.0 U[3] | 5.7 | 4.3 | 3.8 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 | 2.3 | 2.2 | 2.0 | 1.9 | 1.9 | 1.8 | 1.7 | 1.6 | 1.6 | 1.4 | 1.3 |
| 1.2 L | - | - | - | - | - | - | - | - | - | - | .1 | .2 | .2 | .3 | .4 | .5 | .6 | .8 | .9 |
| 1.2 U | 6.3 | 4.9 | 4.3 | 3.7 | 3.4 | 3.2 | 3.0 | 2.7 | 2.6 | 2.5 | 2.3 | 2.2 | 2.2 | 2.1 | 2.0 | 1.9 | 1.8 | 1.6 | 1.5 |
| 1.4 L | - | - | - | - | - | - | - | - | - | - | .2 | .3 | .3 | .4 | .6 | .6 | .7 | 1.0 | 1.1 |
| 1.4 U | 6.9 | 5.3 | 4.7 | 4.1 | 3.8 | 3.5 | 3.3 | 3.1 | 2.9 | 2.8 | 2.6 | 2.5 | 2.5 | 2.4 | 2.2 | 2.1 | 2.1 | 1.8 | 1.7 |
| 1.5 L | - | - | - | - | - | - | - | - | - | .1 | .2 | .4 | .5 | .5 | .6 | .7 | .8 | 1.1 | 1.2 |
| 1.5 U | 7.2 | 5.6 | 5.0 | 4.3 | 3.9 | 3.7 | 3.5 | 3.2 | 3.0 | 2.9 | 2.8 | 2.7 | 2.6 | 2.5 | 2.4 | 2.3 | 2.2 | 1.9 | 1.8 |
| 1.6 L | - | - | - | - | - | - | - | - | - | .1 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | 1.1 | 1.3 |
| 1.6 U | 7.5 | 5.8 | 5.2 | 4.5 | 4.1 | 3.9 | 3.7 | 3.4 | 3.2 | 3.1 | 2.9 | 2.8 | 2.7 | 2.6 | 2.5 | 2.4 | 2.3 | 2.1 | 1.9 |
| 1.8 L | - | - | - | - | - | - | - | - | .1 | .2 | .4 | .5 | .6 | .7 | .9 | 1.0 | 1.1 | 1.3 | 1.5 |
| 1.8 U | 8.1 | 6.3 | 5.6 | 4.9 | 4.5 | 4.2 | 4.0 | 3.7 | 3.5 | 3.3 | 3.2 | 3.1 | 3.0 | 2.9 | 2.7 | 2.6 | 2.6 | 2.3 | 2.1 |
| 2.0 L | - | - | - | - | - | - | - | - | .2 | .4 | .5 | .7 | .7 | .9 | 1.0 | 1.1 | 1.2 | 1.5 | 1.6 |
| 2.0 U | 8.6 | 6.7 | 6.0 | 5.3 | 4.8 | 4.5 | 4.3 | 4.0 | 3.8 | 3.6 | 3.5 | 3.3 | 3.3 | 3.1 | 3.0 | 2.9 | 2.8 | 2.5 | 2.4 |
| 2.5 L | - | - | - | - | - | - | - | .3 | .5 | .7 | .9 | 1.0 | 1.1 | 1.2 | 1.4 | 1.5 | 1.6 | 1.9 | 2.1 |
| 2.5 U | 9.9 | 7.8 | 7.0 | 6.2 | 5.7 | 5.3 | 5.1 | 4.7 | 4.5 | 4.3 | 4.1 | 4.0 | 3.9 | 3.8 | 3.6 | 3.5 | 3.4 | 3.1 | 2.9 |
| 3.0 L | - | - | - | - | - | - | .2 | .6 | .8 | 1.0 | 1.2 | 1.4 | 1.5 | 1.6 | 1.8 | 1.9 | 2.0 | 2.4 | 2.6 |
| 3.0 U | 11.0 | 8.8 | 7.9 | 7.0 | 6.5 | 6.1 | 5.8 | 5.4 | 5.2 | 5.0 | 4.8 | 4.6 | 4.5 | 4.4 | 4.2 | 4.1 | 4.0 | 3.6 | 3.4 |

[1] Estimate of Lot Percent Defective From Sample.

[2] L = Lower Limit

[3] U = Upper Limit

TABLE III (Cont.)
ESTIMATE OF PERCENT DEFECTIVE CONTAINERS
CONDITION OF CONTAINER INSPECTION

| 100p 1/ | | SAMPLE SIZE (n) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 18 | 36 | 50 | 75 | 100 | 125 | 150 | 200 | 250 | 300 | 375 | 450 | 500 | 600 | 800 | 1000 | 1250 | 3000 | 6000 |
| 4.0 | L2/ | - | - | - | - | - | .4 | .7 | 1.2 | 1.5 | 1.7 | 1.9 | 2.1 | 2.2 | 2.4 | 2.6 | 2.7 | 2.9 | 3.3 | 3.5 |
| | U3/ | 13.2 | 10.7 | 9.7 | 8.6 | 8.0 | 7.6 | 7.3 | 6.8 | 6.5 | 6.3 | 6.1 | 5.9 | 5.8 | 5.6 | 5.4 | 5.3 | 5.1 | 4.7 | 4.5 |
| 5.0 | L | - | - | - | - | .6 | 1.1 | 1.4 | 1.9 | 2.3 | 2.5 | 2.7 | 2.9 | 3.1 | 3.2 | 3.5 | 3.6 | 3.8 | 4.2 | 4.4 |
| | U | 15.3 | 12.3 | 11.2 | 10.0 | 9.4 | 8.9 | 8.6 | 8.1 | 7.7 | 7.5 | 7.3 | 7.1 | 6.9 | 6.8 | 6.5 | 6.4 | 6.2 | 5.8 | 5.6 |
| 6.0 | L | - | - | - | 0.5 | 1.2 | 1.7 | 2.1 | 2.6 | 3.0 | 3.3 | 3.5 | 3.7 | 3.9 | 4.1 | 4.3 | 4.5 | 4.7 | 5.1 | 5.4 |
| | U | 17.2 | 13.9 | 12.7 | 11.5 | 10.8 | 10.3 | 9.9 | 9.4 | 9.0 | 8.7 | 8.5 | 8.3 | 8.1 | 7.9 | 7.7 | 7.5 | 7.3 | 6.9 | 6.6 |
| 6.5 | L | - | - | - | 0.8 | 1.5 | 2.0 | 2.4 | 3.0 | 3.4 | 3.7 | 3.9 | 4.2 | 4.3 | 4.4 | 4.8 | 5.0 | 5.1 | 5.6 | 5.8 |
| | U | 18.1 | 14.7 | 13.5 | 12.2 | 11.5 | 11.0 | 10.6 | 10.0 | 9.6 | 9.3 | 9.1 | 8.8 | 8.7 | 8.6 | 8.2 | 8.0 | 7.9 | 7.4 | 7.2 |
| 7.0 | L | - | - | - | 1.1 | 1.9 | 2.4 | 2.8 | 3.4 | 3.8 | 4.1 | 4.3 | 4.6 | 4.7 | 4.9 | 5.2 | 5.4 | 5.6 | 6.1 | 6.3 |
| | U | 19.0 | 15.5 | 14.2 | 12.9 | 12.1 | 11.6 | 11.2 | 10.6 | 10.2 | 9.9 | 9.7 | 9.4 | 9.3 | 9.1 | 8.8 | 8.6 | 8.4 | 7.9 | 7.7 |
| 8.0 | L | - | - | - | 1.7 | 2.6 | 3.1 | 3.6 | 4.2 | 4.6 | 4.9 | 5.2 | 5.4 | 5.6 | 5.8 | 6.1 | 6.3 | 6.5 | 7.0 | 7.3 |
| | U | 20.8 | 17.0 | 15.7 | 14.3 | 13.4 | 12.9 | 12.4 | 11.8 | 11.4 | 11.1 | 10.8 | 10.6 | 10.4 | 10.2 | 9.9 | 9.7 | 9.5 | 9.0 | 8.7 |
| 9.0 | L | - | 0 | .9 | 2.4 | 3.3 | 3.9 | 4.4 | 5.0 | 5.4 | 5.7 | 6.1 | 6.4 | 6.5 | 6.7 | 7.0 | 7.2 | 7.4 | 8.0 | 8.2 |
| | U | 22.5 | 18.5 | 17.1 | 15.6 | 14.7 | 14.1 | 13.6 | 13.0 | 12.6 | 12.3 | 11.9 | 11.6 | 11.5 | 11.3 | 11.0 | 10.8 | 10.6 | 10.0 | 9.8 |
| 10.0 | L | - | - | 1.5 | 3.1 | 4.0 | 4.6 | 5.2 | 5.8 | 6.2 | 6.5 | 6.9 | 7.2 | 7.3 | 7.6 | 7.9 | 8.1 | 8.3 | 8.9 | 9.2 |
| | U | 24.1 | 20.0 | 18.5 | 16.9 | 16.0 | 15.4 | 14.8 | 14.2 | 13.8 | 13.5 | 13.1 | 12.8 | 12.7 | 12.5 | 12.1 | 11.9 | 11.7 | 11.1 | 10.8 |
| 12.0 | L | - | 1.2 | 2.8 | 4.5 | 5.5 | 6.2 | 6.7 | 7.4 | 7.9 | 8.2 | 8.6 | 8.9 | 9.1 | 9.4 | 9.7 | 9.9 | 10.16 | 10.8 | 11.1 |
| | U | 27.3 | 22.8 | 21.2 | 19.5 | 18.5 | 17.8 | 17.3 | 16.6 | 16.1 | 15.8 | 15.4 | 15.1 | 14.9 | 14.7 | 14.3 | 14.1 | 13.8 | 13.2 | 12.9 |

1/ Estimate of Lot Percent Defective From Sample

2/ L = Lower Limit

3/ U = Upper Limit

TABLE III ( Cont.)
ESTIMATE OF PERCENT DEFECTIVE CONTAINERS
CONDITION OF CONTAINER INSPECTION

| 100p 1/ | | SAMPLE SIZE (n) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 18 | 36 | 50 | 75 | 100 | 125 | 150 | 200 | 250 | 300 | 375 | 450 | 500 | 600 | 800 | 1000 | 1250 | 3000 | 6000 |
| 14.0 | L2/ | - | 2.4 | 4.2 | 5.9 | 7.1 | 7.7 | 8.3 | 9.1 | 9.6 | 10.0 | 10.3 | 10.7 | 10.9 | 11.2 | 11.6 | 11.8 | 12.0 | 12.7 | 13.0 |
| | U3/ | 30.4 | 25.6 | 23.8 | 22.1 | 20.9 | 20.3 | 19.7 | 18.9 | 18.4 | 18.0 | 17.7 | 17.3 | 17.1 | 16.8 | 16.5 | 16.2 | 16.0 | 15.3 | 15.0 |
| 16.0 | L | - | 3.8 | 5.6 | 7.5 | 8.7 | 9.5 | 10.0 | 10.8 | 11.4 | 11.8 | 12.2 | 12.5 | 12.7 | 13.0 | 13.4 | 13.7 | 13.9 | 14.7 | 15.1 |
| | U | 33.2 | 28.2 | 26.4 | 24.5 | 23.3 | 22.5 | 22.0 | 21.2 | 20.6 | 20.2 | 19.8 | 19.5 | 19.3 | 19.0 | 18.6 | 18.3 | 18.1 | 17.3 | 16.9 |
| 18.0 | L | - | 5.2 | 7.1 | 9.1 | 10.3 | 11.1 | 11.7 | 12.6 | 13.1 | 13.6 | 14.0 | 14.4 | 14.6 | 14.9 | 15.3 | 15.6 | 15.9 | 16.6 | 17.1 |
| | U | 36.1 | 30.8 | 28.9 | 26.9 | 25.7 | 24.9 | 24.3 | 23.4 | 22.9 | 22.4 | 22.0 | 21.6 | 21.4 | 21.1 | 20.7 | 20.4 | 20.1 | 19.4 | 18.9 |
| 20.0 | L | 1.2 | 6.7 | 8.7 | 10.8 | 12.0 | 12.8 | 13.5 | 14.3 | 14.9 | 15.4 | 15.9 | 16.2 | 16.4 | 16.7 | 17.2 | 17.5 | 17.7 | 18.5 | 19.0 |
| | U | 38.9 | 33.3 | 31.3 | 29.2 | 28.0 | 27.2 | 26.5 | 25.7 | 25.1 | 24.6 | 24.1 | 23.8 | 23.6 | 23.3 | 22.8 | 22.5 | 22.3 | 21.5 | 21.0 |
| 25.0 | L | 4.6 | 10.6 | 12.8 | 15.0 | 16.3 | 17.3 | 17.9 | 18.9 | 19.5 | 20.0 | 20.5 | 20.9 | 21.1 | 21.5 | 21.9 | 22.3 | 22.6 | 23.4 | 24.0 |
| | U | 45.4 | 39.4 | 37.2 | 35.0 | 33.7 | 32.7 | 32.1 | 31.1 | 30.5 | 30.0 | 29.5 | 29.1 | 28.9 | 28.5 | 28.1 | 27.7 | 27.4 | 26.6 | 26.0 |
| 30.0 | L | 8.4 | 14.7 | 17.0 | 19.4 | 20.8 | 21.8 | 22.5 | 23.5 | 24.2 | 24.7 | 25.3 | 25.7 | 25.9 | 26.3 | 26.8 | 27.1 | 27.4 | 28.3 | 28.8 |
| | U | 51.6 | 45.3 | 43.0 | 40.6 | 39.2 | 38.2 | 37.5 | 36.5 | 35.8 | 35.3 | 34.7 | 34.3 | 34.1 | 33.7 | 33.2 | 32.9 | 32.6 | 31.7 | 31.2 |
| 35.0 | L | 12.5 | 19.1 | 21.5 | 24.0 | 25.5 | 26.5 | 27.2 | 28.3 | 29.0 | 29.5 | 30.1 | 30.6 | 30.7 | 31.1 | 31.6 | 32.0 | 32.3 | 33.3 | 33.8 |
| | U | 57.5 | 50.9 | 48.5 | 46.0 | 44.5 | 53.5 | 42.8 | 41.7 | 41.0 | 40.5 | 39.9 | 39.4 | 39.3 | 38.9 | 38.4 | 38.0 | 37.7 | 36.7 | 36.2 |
| 40.0 | L | 16.9 | 23.7 | 26.1 | 28.7 | 30.2 | 31.3 | 32.0 | 33.1 | 33.8 | 34.3 | 34.9 | 35.4 | 35.6 | 36.0 | 36.5 | 36.9 | 37.2 | 38.2 | 38.7 |
| | U | 63.1 | 56.3 | 53.9 | 51.3 | 49.8 | 48.7 | 48.0 | 46.9 | 46.2 | 45.7 | 45.1 | 44.6 | 44.4 | 44.0 | 43.5 | 43.1 | 42.8 | 41.8 | 41.3 |

1/ Estimate of Lot Percent Defective From Sample

2/ L = Lower Limit

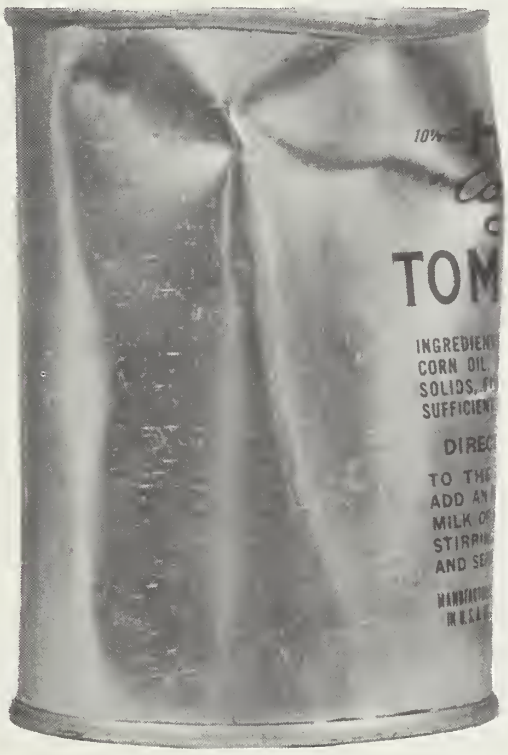
3/ U = Upper Limit

## BODY DENT INVOLVING END SEAM

No. A-1

**MAJOR DEFECT**

## BODY DENT CAUSING SHARP RIDGE



No. A-2

**MAJOR DEFECT**

CAN DEFECTS

# FALSE SEAM

No. A-3

| NON-LEAKING<br>MAJOR DEFECT | LEAKING<br>CRITICAL DEFECT |
|---|---|

## BODY DENT

No. A-4

LOWER LIMIT OF A MINOR DEFECT

## BODY DENT

No. A-5

UPPER LIMIT OF A MINOR DEFECT

## BODY DENT

No. A-6

**UPPER LIMIT OF A MINOR DEFECT**

## BODY DENT

No. A-7

LOWER LIMIT OF A MAJOR DEFECT

## BODY DENT

No. A-8

MINOR DEFECT

## BODY DENT

No. A-9

**UPPER LIMIT OF A MINOR DEFECT**

## BODY DENT

No. A - 10

**UPPER LIMIT OF A MINOR DEFECT**

## BODY DENT

No. A-11

**LOWER LIMIT OF A MINOR DEFECT**

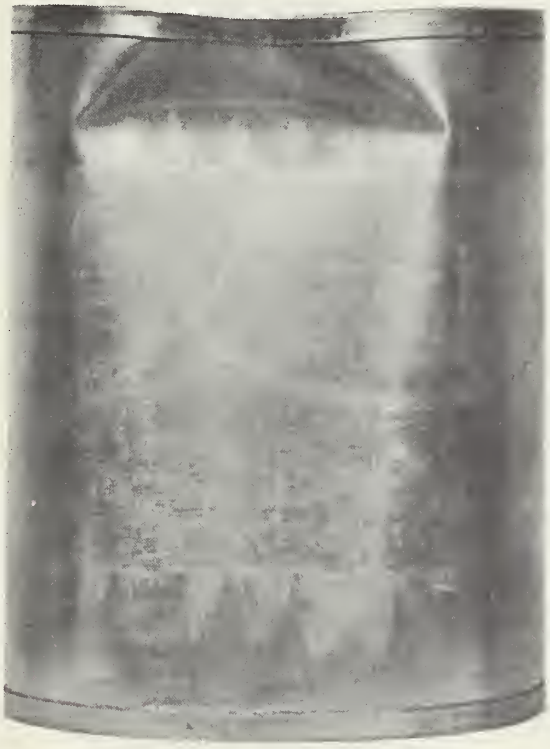
## BODY DENT

No. A-12

**UPPER LIMIT OF A MINOR DEFECT**

CAN DEFECTS

## BODY DENT



No. A-13

LOWER LIMIT OF A MAJOR DEFECT

CAN DEFECTS

BODY DENT

No. A - 14

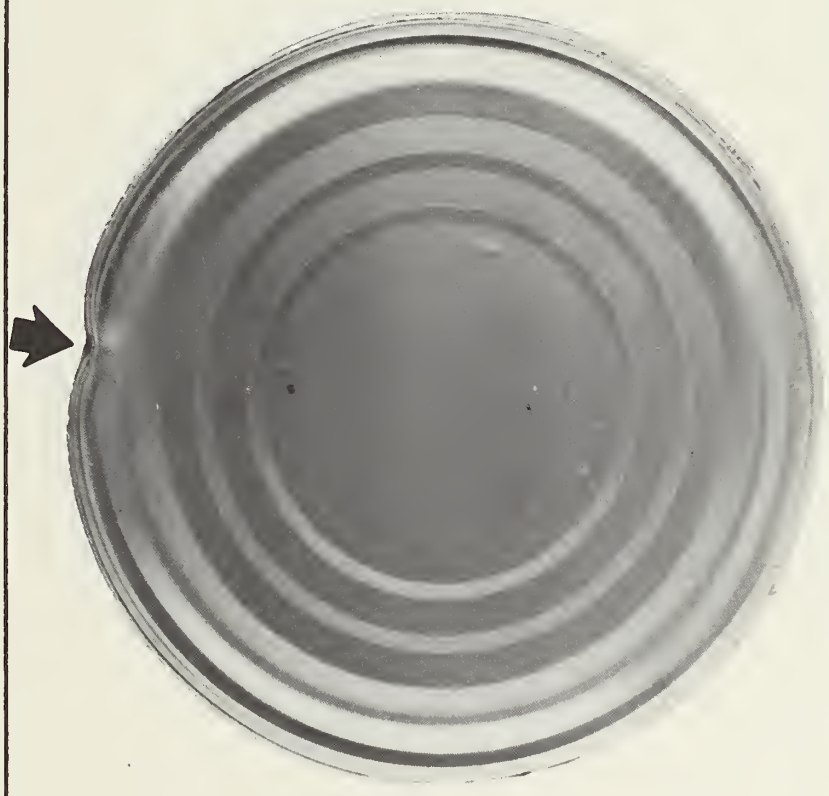
**LOWER LIMIT OF A MINOR DEFECT**

## BUCKLES ON END EXTENDING INTO END SEAM

No. B-1

**MAJOR DEFECT**

## END SEAM DENTS



No. B-2

LOWER LIMIT OF A MINOR DEFECT

## END SEAM DENTS

No. B-3

**UPPER LIMIT OF A MINOR DEFECT**

## END SEAM DENTS

No. B-4

**LOWER LIMIT OF A MINOR DEFECT**

## CAN DEFECTS

### END SEAM DENTS

No. B-5

**UPPER LIMIT OF A MINOR DEFECT**

## CABLE CUT
## (NON-LEAKER)

No. C-1

MAJOR DEFECT

## BEAD
## (BUBBLE IN GLASS EXCEEDING 1/8" DIAMETER)

No. G-1

**MAJOR DEFECT**

**CHECKED**
**(SLIGHT CRACK, NON-LEAKING)**

No. G - 2

**MAJOR DEFECT**